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Optical design and performance verification of Herschel-HIFI

Jellema, Willem

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Propositions

accompanying the dissertation

Optical Design and Performance Verification of Herschel-HIFI

1. Unambiguous comparisons of electromagnetic simulations and experimental tests of complex submillimeter-wave optical systems are greatly facilitated by very accurate phase-sensitive near-field techniques *featuring control of the absolute geometry of the experimental arrangement* within fractions of a wavelength (this thesis).
2. Synergie ontstaat daar waar mensen bereid zijn samen te werken, niet door ze enkel op één plaats samen te brengen.
3. Achieving an absolute flux calibration accuracy of 3% is not consistent with the common practice of the radio astronomy community of characterising angular response using Gaussian beam optics (this thesis).
4. The dominant measurement error due to complex multi-path reflections and standing waves, commonly observed in THz beam pattern measurements, can be substantially reduced by a phase-compensated average of two samples separated by a quarter wavelength (this thesis).
5. Een beetje verlies is soms pure winst.
6. Long-wave diffractive effects present in submillimeter-wave optical systems, even though perfectly aligned using visible light, can result in apparent misalignment at actual wavelengths (this thesis).
7. Op het moment dat politieke woordvoerders beweren dat meer dan de helft van de scholieren boven het gemiddelde dient te scoren, wordt het hoog tijd dat er ook in Den Haag een verplichte reken-toets wordt ingevoerd.
8. The co-alignment realized for the highest frequency bands of HIFI saved astronomers a factor two of observing time when taking pointed observations in bands 6 and 7 (this thesis).

9. Direct measurement of beam pattern phase is key to the alignment and optical performance verification of submillimeter-wave optical systems (this thesis).
10. Een optisch ontwerper heeft de eervolle taak zo weinig mogelijk potentiële detectorprestatie om zeep te helpen.
11. Detailed beam profiles can be extracted from multiple observations of unresolved planets with known spatial distributions by using a forward model approach (this thesis).
12. Leiding geven aan een innovatieve groep ruimteonderzoekers is vooral een kwestie van om kunnen gaan met de eigenaardigheden van creatieve en onvoorspelbare individuen in plaats van hen in een keurslijf te willen dwingen.
13. Het zwakste punt van een sterk wachtwoord is de manier waarop het "onthouden" wordt.
14. The ability to control the optical performance of instruments as complex as Herschel-HIFI at the lowest level of integration requires an early alignment and verification strategy as part of the system optical design (this thesis).

Willem Jellema, March 2015